A Synopsis Entitled

Study of some useful medicinal plant extracts to defend *Rhyzopertha dominica* an insect pest destructing stored grains in Latur District (M.S) India.

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Study of some useful medicinal plant extracts to defend *Rhyzopertha dominica* an insect pest destructing stored grains in Latur district (M.S) India.

Introduction:-

It is the well-known fact that the food grains are the most essential part of our nutritional dietary requirement as it provide the carbohydrates and proteins required for growth as these are the rich source of energy. So, we cannot imagine the balanced diet without these food grains. Farmers through their farming they produce the food grains but due to poor pest management millions of ton food grains are destroyed by number of pests in ware houses and Go-downs. Proper pest management is essential in our country during the off season, when fresh food is not available human beings have to consume stored grain food, unfortunately these stored grains are later infested by many pests. Grains are stored in bags which are very much susceptible to infestation with several pests which can cause extensive post-harvest losses, spoilage and less demand in markets causing a huge loss of stored grain, pests management becomes necessary to prevent these from insect's pests (Rayees Ahmad et all,2021).

Insects damage the stored seeds grains due to this there is a continuous loss of quality and weight which was at the time of storage. To stop this, we need to protect the stored product against diminution. To protect the grain we must change the present environmental conditions. The quality and quantity of stored grains are lost due to feeding and waste production by some insects, mites, rodents, birds or from microorganisms (Chayngia et al.,2010).

Almost 8-10%i.e 13 million tons of grains lost due to insects and 100 million tons due to failure to store properly is estimated in stored food products all around the world. Pests such as various insects pathogens, mites possess serious threats and cause severe damage to grains (Syedn Nighat.,2021)

Wheat which has an important role in the nutrition of human beings, animals and several cottage industries in India is attacked by lesser grain borer during storage. the grain infested by this pest is rendered unfit for human, animal consumption and also for any industrial use.

Food and agriculture organization (FAO) says that the world may face a massive scarcity of food. If the total food production is not increased by the year 2050 (Singh et.al., 2021) The infested and damaged seeds become perforated and lead to loss of seed weight long time keeping and the cultural product are related to the losses of quality and quantity, grains ingredients and good will values in cereals ,pulses ,oil seeds and nuts .lesser grains borer (*Rhyzopertha dominica*) is competent of contaminating the grains and expanding very quickly in the destruction of overall grains. In the stored grain food stuff dirt is mixed up , hence there may loss the quality and quantity of food grain ,therefore effective storage protection methods are urgently required (Meena et al.,2016). Variety of chemical insecticides and pesticides are used to control insect pests. However, harmful effects and persistent nature of the chemical pesticides demand for eco-friendly alternative.The environmental hazards posed by synthetic pesticides providean impetus for investigations into some ecofriendly and bio-rational alternatives (Ramya et al.,2009).

To prevent grains from pests into powder form of plant parts can be directly incorporated into grain and also as fumigants . it can cause death of developing stages of pests (shaaya and kostyukovsky 2006). Naturally the plant comprises a useful elements that acts as protection from insect pests (priyantiniwidiy aningruum et.al.,2019) *Rhyzopertha dominica* is a highly destructive and primary stored product pest it belongs to the family Bostrichidae.To protect the food grains from there pests there are mainly two methods one is use of pesticides like DDT ,BHC, And others methods include the biological control .

Purpose of research work-

- This work has been undertaken to find the effect of natural methods to control the distraction of food grains due to insects by plant extraction which will be helpful for reduction of the pest population.
- It will helpful to save the food grain losses, money and time.
- The present research work will be useful to find better storage ,pest control methods which will be helpful to feed some citizens of India.

- **Review of literature: -**

Rhyzopertha dominica is a major pest that damages grains in temperate and tropical are as *Rhyzopertha dominica* is a worldwide insect pest that feeds on stored seeds(Perisic et.al .,2018) Extracted plant powders of *Calatropisprocera , Brassia competes, Cassia fistula , Lantana camera and Linum usitatissimum* are very operative to dominate *Rhyzopertha dominica*.

Plant extracts of several plants demonstrate significant toxic , fumigant and repellent effect on the adult of *Rhyzopertha dominica* (Arifuzzamanet al 2014) this plants have bioactive compounds such as alkaloids , flavonoids , coumarins,tannins ,volatile oil , glycosides and terpenes (Zeeshan Ali and uroojmazhar 2018).To analyze the phyto chemicals of the test plants preliminary tests were conducted to determine secondary metabolites while gas chromatography mass spectrum (GC-MS) was carried out to identify various, active compounds present in the botanical extracts (Ramlatu Abubakar 2021).

Extracted plan

*,Lant*t powders of *Calatropisprocera, Brassiacompetes,Cassia*

istulaanacamera,and Linum vsitatissimum are very operative to domininate *Rhyzopertha dominica*.the most toxic effectof cassia fistula leaf powder on *Rhyzopertha dominica* it shows 80% mortality rate per 10 gm leaf powder of lantana camera shows 58.3339% mortality rate 10 gm it was a less toxic mortality rate of *Rhyzopertha dominica* adults after 24 hours of exposure to calatropis procera leaflet powder it more efficient that has 75% rate of mortality . In 24 hour of exposure the infletedfatality rate of 10 gm brassica competes and linumusitatssimum of 20 gm wheat 65.00% & 81.6666%.The overall study indicates that the local plants have good potential against the stored pest management, especially for *Rhyzopertha dominica* (Dang &Rela 2020).

All plant extracts expressed significant lethal actions against *Rhyzopertha dominica* application of highly concentrated (10%) C.procera showed maximum mortality (77.26%) after 72 h of treatment while minimum mortality

was observed by E.globulus (58.10%) at lowest concentration of 1% maximum mortality of *Rhyzopertha dominica* adults were attained at 10% concentration of C.procera which was 77.26% followed by 72.96% ,O.basilicum 61.40% P.hysterophorusand 58.10% mortality was obtained on E.globulus after exposure time for 72 hours (Rabia Fatima et.at 2020).

The results of this study indicated the insecticidal activities of plant powders against *Rhyzopertha dominica* in stored rice seeds upto four months of storage duration. Different plant powders used in experiment possessed some chemicals that caused repellent, antifeedant , growth regulating effect and acute toxin on adult R. dominica . among them tobacco leaf & black paper seed powders were the most effective on the mortality .powders of these botanicals may have also disrupted the normal respiratory activities of *Rhyzopertha dominica* leading to the asphyxiation& death (may myatmon et.al 2015).

Study of medicinal plants such as pepernigrum,zingiber officinale & nicotiana tobacum to opposed the *Rhyzopertha dominica* to determine safe and highly toxic chemicals from plants to control store grain pest.

- **Research gap:-**

1) the present work will be one of the initial research works which would be useful to focus on the study of some useful medicinal plant extracts to defend *Rhyzopertha dominica* an insect pest distructing stored grains in Latur district because up till no such work has been carried out in Latur district.

2) As very less attention has been given by Government of Maharashtra and other agencies on the control of insect pest by plant residues.

3) This work may be helpful to divert the attention all the Goveronment agencies towards the control of insect pests by eco-friendly methods.

4) There is a large gap in such work after 1990 or even before as nobody in Latur district has undertaken such work it will be first effort.

5)This work will fill up the research gap in this subject in last couple of decades.

Importance of the study:-

- **International importance:-**

1. With the help of eco-friendly pest management we can avoid our dependence on food grain import from other countries.
2. It will protect the food grain losses by such plant extract based pest control method.
3. Every year nearly 40 million tons of food grains are destroyed which costs about 7000 Crores.
4. Above loss of food grains can be controlled by ecofriendly pest management.
5. If the stocking of grains is well managed then no import will be required, so expenditure on food grains will be saved.
6. As our country with annual wheat production 112.74 million tons in the ongoing 2022-23 crop year (July-June), every year is on second rank in international market. We can improve our rank by better pest control system.
7. India is on Third rank with 4.63 million tons Jawar production in 2019-20 , we can improve our international rank of Jamar production.
8. In year 2021-22 our country purchased 0.18 crores wheat and other cereals we have purchased around 370 crores rupees on Maize, Jawar ,Bajara etc. this amount can be saved in future by better pest management.

- **National importance: -**

1. Grain quantity in ware houses and Go-downs and ware houses will be protected from predation or eating by insects.
2. After food grain protection the cost of grains will be managed and farmer may be benefited.
3. India can earn more foreign currency by exporting the grains and by applying better storage methods.
4. Protection of the food will be useful for the farmer and price hike may be controlled.
5. Extensive post harvesting losses can be managed.

6. Pest management will be fruitful for farmers and citizens of our country. Due to this national progress can be accomplished with the small change in storage practice and pest management.

- **Regional status:-**

  In the Marathwada region very less attention has been given towards control of insect pest by natural method. This plant extract based method to control the insect pest will be less hazardous for human beings.It will also useful to save the loss of grain by insect pests .

- **Scope of the study: -**

  This work will be useful for: -

  1. To improve excellent quality of stored grains which will be helpful for food security.
  2. To create awareness of the use plant based and eco-friendly pest control management for stored grain among the farmers and workers regarding insect pest management.
  3. Improve traditional storage practices.
  4. To develop effective biopesticides based agricultural practices for the storage of grains.
  5. To provide new and better food grain storage method.

- **Objectives of research work :**

1. To study the complete life history of selected insects pests in laboratory conditions.
2. To examine the rate of emergence, mortality and fecundity of selected pest.
3. To examine the effect of medicinal plant extract on *Rhyzopertha dominica* which is an insect grain pest.

4. To find new ways to improve the good quality of stored grain by medicinal plant extracts.

- **Hypothesis :-**

When we use of the synthetic compound to control insect pests shows hazardous effects on animal life and causes pollution . From many years ago natural plant products have been used , these have no toxic effects to feeders has easily biodegradable and nil residues.(p.Lakshmi soujanya et.al.,2016).

Many plants contain compounds like phytochemicals such as alkaloids, terpenoids, phenolic acid, saponin and flavoneoids they have defence mechanism to protect opposed pests. The advice to use some artificial pesticides in agricultural field to the control of pests to over come such harmful pesticide impacts on the ecosystem, their application and availability are now declining due to new legislation and resistance power generated by different insect pest against synthetic chemical pesticides.

- **Material and methods**:-

1. Collection of insect pests:-

Wheat is the world's most important cereal crop in relation to production and consumption by billions of people.*Rhyzopertha dominica* distructs this food grain it's destruction potential is more so it was selected for the study. Adult insects of lesser grain borer *Rhyzopertha dominica* would be collected from the grain market yard in Latur district and reared in the stored grain laboratory to get the homogeneous population at optimum lab conditions.

2.Rearing of *Rhyzopertha dominica :-*

Collected pests i.e *Rhyzopertha dominica* would be reared in the stored grain laboratory to get the homogenous population at optimum conditions. Prior to the rearing of *Rhyzopertha dominica* , these grains would be sterilized at a temperature of 55^0 c for 6 hours ,in order to eliminate any hidden infestation.Clean, healthy& un-infested grains of wheat in plastic jars covered

with muslin cloth were used for rearing purpose of Rhyzopertha doninica insect species.

Rearing of insects would be done in sterilized plastic jars along with 1 kg per 1000 gm. They were kept in an incubator for oviposition at 30C & 70 % relative humidity for 10 days.

The insects would be allowed to grow in natural environment as in traditional structure & checked at regular intervals. After the five days the adults would be sieved& grains along with eggs were again put into jars and kept again under optimum conditions to develop a homogeneous population.

3.Collection of plants: -

Selected plant species particular parts would be used for the phytochemical effects including *Curcuma longa, Azadirachta indica,Carica papaya ,Zingiber officinale , Sapindus mukorossi* which will collect from local area from latur district , based on traditional medicinal uses such as seeds or leaves.

Plant materials were washed with distilled water, dried under shade and ground with the help of electric grander to a powdered form (dabire et al.,2008) Powder was sieved out through a fine mesh sieve.

4. Preparation of plant extracts:-

Extraction of plant materials were done using acetone as a solvent by adding 50 gm of power of each plant powder in 250 ml of acetone in conical flasks.

The mouth of each flask will be closed by aluminium and cotton plug to prevent evaporation Whiteman filter papers were treated with plant extracts of different concentration And were kept In lab to rotatory evaporator for few hours to evaporate solvent . different concentration of each plant extract i.e 1,2,4,8and 10% where prepared using acetone against *Rhyzopertha dominica*.

5.. Exposure to plant extract: -

To check the mortality of adults of *Rhyzopertha dominica* ,experiment will be carried out using petri dishes and whatman filter paper for bioassay .different

concentrations (1%, 2%, 4%, 8% and 10%) of plant extracts were applied on the filter paper and then the filter paper would beallowed to get dry . Twenty adults of test specimen will be released in petry dishes and covered with lid.mortality of the adults will be recorded three times after equal intervals of 24 hours.(Syeda Yusra zaineb et.al 2020). The percent age of mortality will be corrected using the mathematics formula.

6.Qualitative analysis of phytochemicals:-

Plants biosynthesize phytochemicals to protect themselves from insect attacks and plant diseases. phytochemicals are plant chemicals. have a disease preventive properties.the qualitative analysis is very essential to identify the phytochemical constituents present in medicinal plants. By using standard analytical techniques, the determination of chemical groups or compounds in aqueous extracts from different plants. Saponins, Tanins , Terpenoids , Steroids , Starch ,Alkaloids , phenols , Flavoniods analyzed qualitatively by following the standard protocols.

7.Histopathological study: -

The Mortality of the adults, larval and pupal stage of *R. dominica* will be tested through histopathology of different gut tissues.the morphology of tissue will be observed and examine comparative morphology changes of control and experiment.

Limitations:-

This work should be utilized by Government to control insect pest by this natural method. Government uses chemical pesticides to control insect pest which may be hazardous to human health but natural method is eco-friendly and non hazardous.

- **Expected outcomes:**

1. This study will help to maintain the quantity and quality of stored grains.
2. This work will be helpful to reduce the use artificial chemical pesticides effects on the economical importance of insects pests and other harmful effects on ecosystem as well as human health.

3. This research study-to emphasize the use of biodegradable pesticides to control the insects affecting the stored grains.
4. This work will be useful to maintain the clean and uncontaminated condition of stored products through eco-based pest management.

About the Study area

Latur is Located at Latitude- 18° 24' 31.6512'' N, Longitude- 76° 33' 37.3932'' E , it is 617.938 meters from sea level .This District is sharing borders with other districts such as Bidar to the East, Nanded to the North, Dharashiv [formerly known as Osmanabad] to the west. It is sharing Border with Karnataka State to the South. Latur District occupies an area of approximately 7157 square kilometres. It's located in the 657 meters to 620 meters elevation range. This District belongs to Western India.

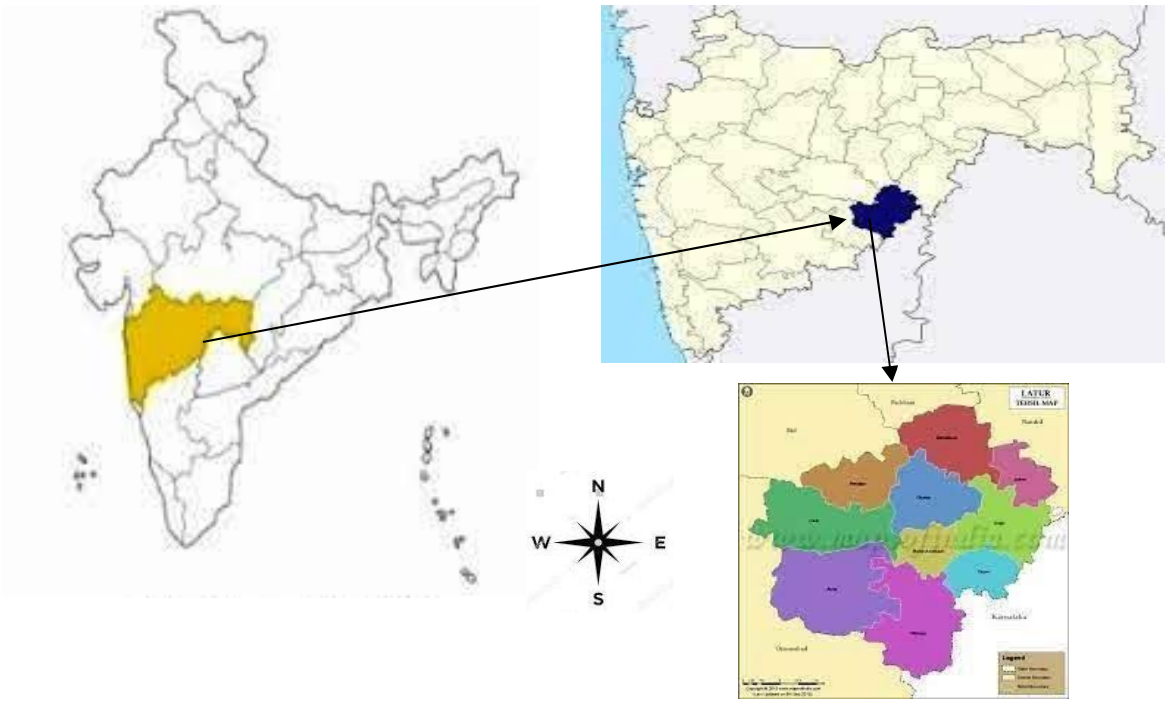

Fig-1.Map of the study area showing Latur district

- **Proposed work plan with tentative chapter scheme:-**

1. **First year:**

   Chapter 1: Introduction

   Chapter 2: Collection and the review of literature.

   Chapter 3: Collection of selected insect species and extraction of plants materials.

   Chapter 4: Study of life cycle stages *Rhyzopertha dominica*.

2. **Second year:** To analyze the percentage of mortalities of *Rhyzopertha dominica* after applying the plant extracts on the insects. The mortality of the adult *Rhyzopertha dominica* will be tested through histopathology of different gut tissues.

3. **Third year:** Completion of all statistical calculations and graph construction will be done. The Thesis writing and fulfillment of requirements towards the submission process will be done.

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